

Hartford, Hartford county: the heavy rainfall of the 11-13th caused a freshet in the Connecticut River, and in all streams throughout the state; at towns within eight to twelve miles of this place mills were inundated; at Meriden, eighteen miles south, several large factories were compelled to suspend operations. Numerous washouts occurred on the New York and New England Railroad, preventing the running of trains.

Massachusetts.—**Boston:** the heavy rain of the 12-13th, together with six or seven inches of snow on the ground, caused one of the most destructive floods in the south end of the city that has ever occurred; it is estimated that the damage in Boston alone will amount to half a million dollars.

Fall River, Bristol county: the heavy rain of the 11-13th turned the streets and flats into rivers and ponds, filling cellars and basements of several mills, doing great damage to the stock. Numerous washouts occurred along the line of the railroad. The damage in this city will amount to \$10,000.

Peabody, Essex county: the worst freshet ever known at this place occurred on the 12th; streets were inundated and cellars flooded. The loss is estimated at from \$25,000 to \$30,000.

Brockton, Plymouth county: the flood in the Salisbury River on the 12th inundated several factories, compelling the suspension of work and seriously damaging the stock and machinery; streets were submerged, and the bridge over the main thoroughfare carried away. The damage to property, both public and private, will amount to nearly \$100,000.

Malden, Middlesex county: Barrett's Pond overflowed on the 12th, flooding the lower floors of all buildings on its banks. Goods in Cochran's print and turkey-red works were damaged to the amount of \$20,000; the cotton factory of George K. Goulding was flooded, and \$10,000 worth of cotton ruined. The loss in this city is estimated at \$50,000.

Franklin, Norfolk county: in addition to the large loss resulting from the flood, the Cumberland dam of the Pautucket water-works, built last fall, was swept away on the 12th, causing a loss of \$100,000.

Foxborough, Norfolk county: the flood of the 12th caused damage to mills and factories to the amount of \$37,000.

Gloucester, Essex county: the flood of the 12th was the most destructive ever known; streets were impassable, houses flooded, and great damage done.

New Bedford, Bristol county: the heavy rain of the 11-12th caused considerable damage in the northern part of the city; several washouts occurred on the line of the Old Colony Railroad.

Taunton, Bristol county: the rainfall of the 11-12th was the greatest for the past eighteen years; Mill River overflowed its banks, flooding the streets, filling cellars, and causing washouts on the railroads. Most of the bridges in the city were carried away or badly damaged, and gullies in some cases fifty feet wide were cut in the streets. All the dams in the river were swept away or rendered useless. The damage is estimated at \$200,000.

Somerset, Bristol county: the heavy rains of the 11-12th caused a destructive flood; dams and bridges were washed away, roads deeply gullied and made impassable, fields turned into lakes, and many cellars flooded. Mails were delayed four days owing to the damage done to railroads.

Natick, Middlesex county: a large washout occurred at this place on the Boston and Albany Railroad, the break being fifty feet wide and fifteen feet deep; railroad traffic was suspended from noon of the 13th until the evening of the 15th.

The damage by the flood at Winchester, Middlesex county, is estimated at \$35,000; Newton, Middlesex county, \$25,000; Quincy, Norfolk county, \$25,000; Watertown, Middlesex county, \$20,000; at Wollastou, Norfolk county, the lowlands were flooded to the depth of ten feet, and many families had to be moved in boats; two dams were washed away at Stoughton, Norfolk county, and great damage was done at Attleborough, Bristol county.

Illinois.—**Pekin, Tazewell county:** the Illinois River rose to

eleven feet above "tidal" mark on the 15th and continued high until the 23d; the lowlands were submerged on the 19th.

HIGH TIDES.

Eastport, Maine, 19th, 20th, 21st, 22d.
Jersey City, New Jersey, 12th.

LOW TIDES.

New York City: the high wind of the 26-27th blew a large portion of the water out of the harbor, causing the lowest tide known for many years; at high tide during the afternoon of the 27th the water was below the ordinary low-water mark.

Philadelphia, Pennsylvania: owing to the unusually low tide on the 27th and 28th vessels were unable to make their way up or down the river.

Low tides were also reported from the following stations:

Sandy Hook, New Jersey, 27th.
Chincoteague, Virginia, 19th to 22d.
Indianola, Texas, 16th, 19th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for districts east of the Rocky Mountains during February 1886, with the telegraphic reports for the succeeding thirty-two hours, shows the general average percentage of verifications to be 83.90 per cent. The percentages for the four elements are: Weather, 87.32; direction of the wind, 83.73; temperature, 81.19; barometer, 82.69 per cent. By geographical districts, they are: For New England, 81.68; middle Atlantic states, 84.95; south Atlantic states, 87.85; eastern Gulf states, 87.68; western Gulf states, 84.65; lower lake region, 83.28; upper lake region, 81.48; Ohio Valley and Tennessee, 84.34; upper Mississippi valley, 80.29; Missouri Valley, 83.15. There was one omission to predict, out of 2,894, or 0.03 per cent. Of the 2,893 predictions that have been made, ninety, or 3.11 per cent., are considered to have entirely failed; one hundred and two, or 3.52 per cent., were one-fourth verified; three hundred and forty-eight, or 12.03 per cent., were one-half verified; five hundred and one, or 17.32 per cent., were three-fourths verified; 1,852, or 64.02 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

The percentages of verifications of special predictions for certain localities are, as follows:

Omaha, Nebraska (twenty-four days), 81.25; Arkansas (twenty-four days), 85.42; Baltimore, Maryland (twenty-four days), 87.00; Washington City, 86.16; Portland, Maine, 76.34; Boston, Massachusetts, 83.93; Albany, New York, 75.89; Pittsburgh, Pennsylvania, 75.00; Erie, Pennsylvania, 71.88; Lynchburg, Virginia, 77.23; Cincinnati, Ohio, 77.67; Louisville, Kentucky, 79.46; Columbus, Ohio, 77.22; Cleveland, Ohio, 73.21; Oswego, New York, 75.90; Rochester, New York, 71.88; Buffalo, New York, 70.54; Indianapolis, Indiana, 81.70; Detroit, Michigan, 76.79; Toledo, Ohio, 75.00; Sandusky, Ohio, 76.79; Cairo, Illinois, 83.04; Saint Louis, Missouri, 82.14; Kansas (eighteen days), 87.50; Saint Paul, Minnesota, 75.89; Iowa, 79.91; Milwaukee, Wisconsin, 70.54; Chicago, Illinois, 75.00; Memphis, Tennessee, 85.71; Tennessee, 84.82; Shreveport, Louisiana, 84.38; Georgia, 87.95; northern Florida, 84.82; western Missouri (eleven days), 85.23; New York City, 88.84; Philadelphia, Pennsylvania, 83.48; Colorado, 90.18.

CAUTIONARY SIGNALS.

During February, 1886, one hundred and forty-six cautionary signals were ordered. Of these, one hundred and thirty, or 89.04 per cent., were justified by winds of twenty-five miles or more per hour at or within one hundred miles of the station. Fifty-three cautionary off-shore signals were ordered, of which number, forty-nine, or 92.45 per cent., were fully justified, both as to direction and velocity; fifty-two, or 98.11 per cent., were justified as to direction; and forty-nine, or 92.45 per cent., were justified as to velocity. One hundred and ninety-nine signals of all kinds were ordered, one hundred and seventy-nine, or 89.95 per cent., being fully justified. These do

not include signals ordered at display stations where the velocity of the wind is only estimated. Of the above cautionary off-shore signals, forty-four were changed from cautionary. Three signals were ordered late. In twenty-eight cases, winds of twenty-five miles or more per hour were reported for which no signals were ordered.

COLD-WAVE SIGNALS.

During February, 1886, two hundred and sixty-eight cold-wave signals were ordered, of which number, two hundred and forty-seven, or 92.12 per cent., were justified.

RAILWAY WEATHER SIGNALS.

Prof. P. H. Mell, jr., director of the "Alabama Weather Service," in the report for February, 1886, states:

The verifications of predictions for the whole area was 91 per cent. for temperature, and 83 per cent. for weather.

The following corporations comprise this system: South and North; Montgomery and Mobile; Mobile and Girard; Georgia Pacific; East Tennessee, Virginia and Georgia system in Alabama; Memphis and Charleston; Columbus Western; Atlanta and West Point of Georgia; Northeastern of Georgia; Western and Atlantic; East Tennessee, Virginia and Georgia system in Georgia; Montgomery and Eufaula; Pensacola and Selma; Pensacola and Atlantic; and the City of Milledgeville, Georgia.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroral displays occurred during February, as follows:

Escanaba, Michigan: an auroral arch of a pale orange color was observed above a faint segment at 11.18 p. m. of the 3d; beams were observed to shoot up from the ends of the arch; the display continued until 1.35 a. m. of the 4th.

Saint Vincent, Minnesota: an aurora was observed at 8.15 p. m. of the 3d; it first appeared as a pale diffused whitish light having an altitude of 20° and extending from 175° to 210° azimuth; at 10.15 p. m. numerous slender beams were observed, some of which attained an altitude of 30°; the display continued until 2 a. m. of the 4th.

Manistique, Schoolcraft county, Michigan: a faint auroral light, having an altitude of 12° and extending from northwest to northeast, was observed at 7 p. m. of the 7th.

Fort Buford, Dakota: an aurora was observed at 9.18 p. m. of the 10th, consisting of an arch of a whitish color; when first observed it was about 20° above the horizon and rose slowly until at 11 p. m. it attained its maximum altitude, about 45°, and extended from northwest to northeast; a second arch, about 30° in altitude, formed below the first, from which several streamers rose to the upper arch. The lower arch gradually faded away after 11.20 p. m., the upper arch continuing until 11.53 p. m.

Bismarck, Dakota: a faint auroral light of a pale yellow color, extending from 135° to 225° azimuth and having an altitude of 20° and resting on a dark segment 15° in height, was observed at 11.35 p. m. of the 10th.

Burlington, Chittenden county, Vermont: an aurora was observed at 11.55 p. m. of the 10th, consisting of a bright yellow light rising above a bank of clouds in the northern horizon.

Fort Totten, Dakota: an auroral arch was observed from 9.15 p. m. of the 10th until 4.30 a. m. of the 11th, having an altitude of 20° and azimuth 100°.

Tiffin, Seneca county, Ohio: an aurora was observed at 3 a. m. of the 13th, of about 40° azimuth and having an altitude of 10°; its illuminating effect was almost equal to that of dawn and was characterized by recurring fits of brilliancy.

Chincoteague, Virginia: an auroral arch was observed at 10.40 p. m. of the 17th lasting until 1.10 a. m. of the 18th; it extended from about 20° to 180° azimuth with an altitude of 45°; the color was occasionally a brilliant yellowish white but most of the time a dull gray; during the last stages of the display there appeared to be two parallel bands of a grayish white which soon changed to a diffused light and faded away.

Cambridge, Middlesex county, Massachusetts: an aurora was suspected between 8 and 9 p. m. of the 22d.

Saint Vincent, Minnesota: a faint auroral light extending

from 175° to 260° azimuth with an altitude of 15° was observed at 9.45 p. m. of the 22d, the display lasting until after midnight.

Auroral displays were also observed during the month, as follows:

2d.—Mountainville, New York; Winnipeg, Manitoba.

3d.—Fort Totten, Dakota; Winnipeg, Manitoba; Montreal, Quebec.

5th.—Winnipeg, Manitoba.

6th.—Pekin, Illinois; Winnipeg, Manitoba.

7th.—Escanaba and Mackinaw City, Michigan; Webster, Dakota; Pekin, Illinois.

8th.—Pekin, Illinois.

9th.—New Westminster, British Columbia.

10th.—Moorhead, Minnesota; Poplar River, Montana; Webster and Richardton, Dakota.

11th, 12th, 16th.—Winnipeg, Manitoba.

22d.—Eastport and Kent's Hill, Maine; Winnipeg, Manitoba; Sydney, Nova Scotia.

24th.—Bar Harbor, Maine; Winnipeg, Manitoba.

28th.—Montreal, Quebec.

THUNDER-STORMS.

Thunder-storms were reported in the various states and territories, as follows:

Alabama.—Mobile, 3d.

Arizona.—Tucson, 25th, 26th; Fort Verde and Prescott, 22d; San Carlos, 23d; Yuma, 26th.

Arkansas.—Mount Ida, 2d; Little Rock, 10th, 14th.

California.—Cahuenga Valley, 2d, 25th; Red Bluff, 26th; Santa Barbara, 28th; Princeton, 27th.

Colorado.—West Las Animas and Colorado Springs, 27th.

Florida.—Pensacola, 3d.

Georgia.—Savannah, 3d.

Illinois.—Golconda and Philo, 11th; Bluffdale, 18th.

Kansas.—Independence, Yates Centre, Elk Falls, and El Dorado, 24th.

Kentucky.—Penrod, 11th.

Louisiana.—Liberty Hill, 2d; New Orleans, 3d; Grand Coteau, 2d, 10th; Shreveport, 2d, 9th, 10th.

Maine.—Eastport, 15th.

Massachusetts.—Somerset and Blue Hill Observatory, 15th.

Michigan.—Traverse City, 24th.

Mississippi.—Vicksburg, 2d, 3d, 10th, 11th.

Missouri.—Lamar, 9th; Carthage, 25th.

New Hampshire.—Mount Washington, 14th.

New Jersey.—Readington, 25th.

New Mexico.—Lava, 22d; Gallinas Spring, 23d; Puerto de Luna, 23d, 26th.

North Carolina.—Wilmington, Smithville, Fort Macon, and Hatteras, 3d; Weldon, 19th.

Ohio.—Columbus, 12th.

Pennsylvania.—Philipsburg, 19th.

South Carolina.—Charleston, 3d; Stateburg, 3d, 28th.

Tennessee.—Milan, 10th; Nashville, Grief, Parksville, and Hurricane Switch, 11th; Hohenwald and Trenton, 10th, 11th.

Texas.—El Paso, 1st; New Ulm, 1st, 27th; Galveston, 2d, 9th, 10th; Palestine, 9th, 10th; San Antonio, 10th, 23d; Brownsville, 21st; Fort Elliott, 23d, 24th.

Vermont.—Lunenburg, 14th; Strafford, 15th.

Virginia.—Bird's Nest, 25th.

West Virginia.—Parkersburg, 12th.

ELECTRICAL PHENOMENA.

Captain J. W. Cates, of the brig "Arcat," reports that at 9 a. m. of the 9th, when in latitude 23° 20' N., longitude 83° 25' W., a heavy storm of wind, rain, and lightning came from the north and northwest; at 10.15 a. m. a ball of lightning struck on the deck load of cedar and exploded, sending abundance of sparks in all directions. No shock was felt, although the captain and two others were standing within twenty feet of where the ball struck. There was no damage done nor any mark left.